

Question Paper

Portfolio Management (CFA640): January 2009

Section A : Basic Concepts (30 Marks)

- This section consists of questions with serial number 1 - 30.
- Answer all questions.
- Each question carries one mark.
- Maximum time for answering Section A is 30 Minutes.

1. Which of the following statements is/are **not true** regarding trade motivation as explained by Jack Treynor?

[<Answer>](#)

- I. The value traders can use time according to their convenience.
- II. The value traders are more sensitive to time, compared to price.
- III. The information traders tend to be less sensitive to time.

- (a) Only (I) above
- (b) Only (III) above
- (c) Both (I) and (II) above
- (d) Both (I) and (III) above
- (e) Both (II) and (III) above.

2. Tracking error can be caused by

[<Answer>](#)

- I. Transaction costs in construction of the index.
- II. Differences in the composition of the indexed portfolio and the index itself.
- III. Discrepancies between prices used by the organization constructing the index and transaction prices paid by the index manager.

- (a) Only (II) above
- (b) Both (I) and (II) above
- (c) Both (I) and (III) above
- (d) Both (II) and (III) above
- (e) All (I), (II) and (III) above.

3. Which of the following statements is/are **true** with respect to risk penalty?

[<Answer>](#)

- I. Higher the risk penalty, lower the utility of the return for the investor.
- II. The risk penalty will be lower for smaller values of risk tolerance and higher values of variance of asset mix.
- III. For risk loving investors, risk tolerance is high and risk penalty is low resulting in high utility.

- (a) Only (I) above
- (b) Only (III) above
- (c) Both (I) and (II) above
- (d) Both (I) and (III) above
- (e) Both (II) and (III) above.

4. Which of the following strategies can be termed as slightly bearish variation of a long straddle involving purchase of two puts and one call?

[<Answer>](#)

- (a) Strip
- (b) Strap
- (c) Strangle
- (d) Bearish spread using call
- (e) Bearish spread using put.

5. Mr. Vivek, a portfolio manager, is planning to construct an internationally diversified portfolio. In this regard, [<Answer>](#)
which of the following information does he require for making an international diversification successful?
- I. Returns available in different countries.
 - II. The risk attached to each foreign market.
 - III. The coefficient of correlation across international markets.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Both (I) and (II) above
 - (d) Both (I) and (III) above
 - (e) All (I), (II) and (III) above.
6. Which of the following factors is **not** considered by Burmeister, Ibbotson, Roll and Ross (BIRR) macro [<Answer>](#)
economic factor model?
- (a) Investor confidence
 - (b) Interest rates
 - (c) Exchange rate fluctuations
 - (d) Real business activity
 - (e) Market index.
7. The expected return on the market portfolio is 14.48% and the standard deviation of its returns is 20%. If the [<Answer>](#)
slope of capital market line is 0.4, the price of 91 day T-Bill is
- (a) Rs.96.50
 - (b) Rs.96.75
 - (c) Rs.97.50
 - (d) Rs.98.41
 - (e) Rs.98.72.
8. The Capital Market Line (CML) is upward sloping because [<Answer>](#)
- (a) It shows the optimum combination of risky securities
 - (b) It contains all securities weighted by their respective market values
 - (c) Investors are risk-averse
 - (d) It indicates the required return for each portfolio risk level
 - (e) It considers efficient portfolio.
9. Which of the following statements is/are **not true** with respect to package trades? [<Answer>](#)
- I. It is an approach of trading index fund.
 - II. It is actually a process of bundling of a number of orders for execution at different times in the market.
 - III. The goal of a fund manager is to get his money invested as quickly as possible with least cost.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Both (I) and (III) above
 - (d) Both (II) and (III) above
 - (e) All (I), (II) and (III) above.
10. The current price of stock of Idea Cellular is Rs.80 and it is expected that stock price after one year will be either [<Answer>](#)
Rs.99.20 or Rs.60.80. The risk free rate is 6%. The probability of price increase using single period Binomial
model is
- (a) 0.296
 - (b) 0.318
 - (c) 0.375
 - (d) 0.625
 - (e) 0.682.

11. Duration of a bond portfolio is 8 years and its average YTM is 12.60%. If average YTM increases to 12.70%, the percentage change in value of the portfolio is [<Answer>](#)
- (a) +1.12%
 - (b) +0.71%
 - (c) +0.36%
 - (d) -0.71%
 - (e) -1.12%.
12. The current value of Sensex is 9,980 and the annualized dividend yield on Sensex is 4.50%. The risk free interest rate is 7.50% p.a. If 25% of stocks forming part of the Sensex are likely to pay dividends during the next 3 months, the cost of carry for the 3 month Sensex futures is [<Answer>](#)
- (a) Rs. 69.69
 - (b) Rs. 74.85
 - (c) Rs. 99.80
 - (d) Rs.127.65
 - (e) Rs.151.35.
13. The return on the stock of SBI is 17.25% and the return on market is 20%. As per the single index model, the constant return on the stock of SBI that is not related to the market return is 1.5%. If the error term on the stock is 0.75%, the sensitivity of returns of the SBI stock to the market return is [<Answer>](#)
- (a) 0.65
 - (b) 0.75
 - (c) 0.85
 - (d) 0.96
 - (e) 1.10.
14. The rate of return of a portfolio according to Dietz method is 26.24%. The values of the portfolio at the beginning and end of the period are Rs.12,00,000 and Rs.18,00,000 respectively. Net contribution during the period is approximately [<Answer>](#)
- (a) Rs.2,52,051
 - (b) Rs.6,52,051
 - (c) Rs.7,12,060
 - (d) Rs.8,14,261
 - (e) Rs.8,45,632.
15. Which of the following statements is/are **not true** with respect to tax-adjusted CAPM? [<Answer>](#)
- I. Investors in higher tax brackets will prefer to hold a higher percentage of low-yield high capital gains stocks.
 - II. Investors in tax brackets, where marginal tax rate is not significantly different from capital gain tax rate, may prefer to hold high-yield stocks.
 - III. If tax factor is negative, expected pre-tax return is an increasing function of the dividend yield.
- (a) Only (II) above
 - (b) Only (III) above
 - (c) Both (I) and (II) above
 - (d) Both (I) and (III) above
 - (e) Both (II) and (III) above.
16. Which of the following statements is/are **true** with respect to the calculation of the realized rate of return for the portfolio? [<Answer>](#)
- I. The time-weighted rate of return cannot seek to eliminate the distorting effects of cash flows to make more valid comparisons of fund manager's investment skills.
 - II. Under linked internal rate of return, the inflows to and outflows from a fund are spaced across the time when one is dealing with the fund of an individual investor.
 - III. The money weighted rate of return for a period is simply the internal rate of return over that period.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Both (I) and (II) above
 - (d) Both (II) and (III) above
 - (e) All (I), (II) and (III) above.

[<Answer>](#)

17. Mr. Nitin, working with an organization is eligible to receive pension under defined benefit plan. In this regard, which of the following statements is/are **not true**?

- I. He will have an option to receive pension amount even before his retirement.
- II. The amount of pension to be received is directly related to the contribution made by him.
- III. If the pension fund loses money in investments or earns lower than benchmark return, he bears the loss.

- (a) Only (I) above
- (b) Both (I) and (II) above
- (c) Both (I) and (III) above
- (d) Both (II) and (III) above
- (e) All (I), (II) and (III) above.

[<Answer>](#)

18. Ms. Sonia, a highly educated and high-earning woman, has a 'live now attitude'. She has a strong work ethics, but lacks the confidence in herself and at the same time, she attributes her success to luck rather than her ability. According to Kathleen Gurney's 'Nine Money Personalities' model, she can be classified as

- (a) Hunter
- (b) Entrepreneur
- (c) Optimist
- (d) High Roller
- (e) Money Master.

[<Answer>](#)

19. A pension fund has certain liabilities, the duration of which is 12 years. It has following assets in its asset portfolio:

Assets	Remaining maturity (Years)	Weight (%)
ICICI 2016 Deep Discount Bond	8	40
IDBI 2018 Zero Coupon Bond	10	60

Considering the above information, the fund is facing

- (a) Inflation risk
- (b) Credit risk
- (c) Reinvestment risk
- (d) Political risk
- (e) Insurance risk.

[<Answer>](#)

20. Larsen mutual fund has five active managers that when aggregated have characteristics quite similar to those of the BSE 100, with the exception that the aggregate normal portfolio has less exposures than the BSE 100 to growth stocks. Larsen has created a passive portfolio of higher growth stocks, with a goal to create a fund which, when combined with active normal portfolio, produces a composite portfolio with characteristics in line with those of the broad BSE 100. In this regard, the passive fund which is created is called

- (a) Customized fund
- (b) Factor fund
- (c) Style fund
- (d) Completeness fund
- (e) Arbitrage fund.

[<Answer>](#)

21. While managing a portfolio, at which level(s) of decision-making process, the setting of benchmark is done?

- I. Strategic policy decision.
 - II. Asset allocation decision.
 - III. Asset selection decision.
- (a) Only (I) above
 - (b) Only (III) above
 - (c) Both (I) and (II) above
 - (d) Both (I) and (III) above
 - (e) Both (II) and (III) above.

22. Mr. Sinha is holding a long position on the stock of Emkay Ltd. and at the same time created a synthetic short position in order to get the possibility of arbitrage profits. The position taken by Mr. Sinha is generally known as [<Answer>](#)

- (a) Synthetics
- (b) Conversions
- (c) Reversals
- (d) Strips
- (e) Straps.

23. The following are four stocks of a portfolio: [<Answer>](#)

Stock	Proportion	Beta
A	0.133	0.96
B	0.200	1.06
C	0.167	0.87
D	0.500	1.08

If the market return is 12.5% and the risk free rate is 7.20%, the expected return on the portfolio is approximately

- (a) 10.50%
- (b) 10.75%
- (c) 11.50%
- (d) 12.63%
- (e) 13.75%.

24. Mr. Surjith Singh is short on the following option strategies: [<Answer>](#)

Particulars	Premium	Contract Size
One March 170 ITC call	Rs.8.85 per share	1125
One March 190 DLF put	Rs.5.25 per share	400

The maximum expected profit to Mr. Surjith Singh is

- (a) Nil
- (b) Rs. 2,100.00
- (c) Rs. 6,337.50
- (d) Rs. 9,956.25
- (e) Rs.12,056.25.

25. Portfolio X has expected return of 10% and standard deviation of 19%. Portfolio Y has expected return of 12% and standard deviation of 17%. Rational investors will [<Answer>](#)

- (a) Borrow at the risk free rate and buy X
- (b) Sell Y short and buy X
- (c) Sell X short and buy Y
- (d) Borrow at the risk free rate and buy Y
- (e) Lend at the risk free rate and buy Y.

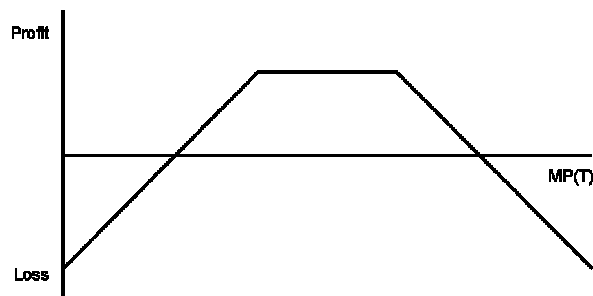
26. A 25 year zero coupon bond is newly issued with a Yield To Maturity (YTM) of 12% and face value of Rs.10,000. If YTM remains the same, the imputed interest income in the first year of the bond's life is approximately [<Answer>](#)

- (a) Rs.120.00
- (b) Rs.116.43
- (c) Rs.101.24
- (d) Rs. 91.65
- (e) Rs. 70.59.

27. Mr. Sethia is holding 10 bonds of Max India Ltd. The market price of a bond is Rs.1,500 and standard deviation of change in the price of the bond is Rs.10.25. One year futures contract on a similar bond is available at Rs.1,575. For minimizing risk, if Mr. Sethia has taken a long position in 7 future contracts on similar bond, the standard deviation of change in futures price is approximately [<Answer>](#)

- (a) Rs.19.52
- (b) Rs.16.65
- (c) Rs.15.50
- (d) Rs.13.95
- (e) Rs.12.16.

28.



[<Answer>](#)

The pay off diagram shown above is associated with

- (a) Protective put
 - (b) Covered call
 - (c) Bullish vertical spread using calls
 - (d) Short straddle
 - (e) Short strangle.
29. Growth rate of industrial production and inflation rate have been identified as factors to determine the expected rate of return on a stock. The sensitivity of returns of the stock to growth rate of industrial production is 1 and to inflation rate is 0.5. When the growth rate of industrial production is expected to be 3% and inflation rate as 5%, the stock is expected to provide a rate of return of 12%. If industrial production actually grows by 5%, while inflation rate turns out to be 8%, the revised estimate of the expected rate of return on the stock is [<Answer>](#)
- (a) 14.5%
 - (b) 15.5%
 - (c) 16.5%
 - (d) 17.5%
 - (e) 18.5%.

30. The main disadvantages of the Black and Scholes model of option pricing is/are [<Answer>](#)

- I. It can not be used for valuing European options.
 - II. This model is not conducive for valuing complex derivative products.
 - III. This model uses all the historical data for calculating the price of option and ignores future developments.
- (a) Only (II) above
 - (b) Both (I) and (II) above
 - (c) Both (I) and (III) above
 - (d) Both (II) and (III) above
 - (e) All (I), (II) and (III) above.

END OF SECTION A

Portfolio Management (CFA640): January 2009

Section B : Problems/Caselet (50 Marks)

- This section consists of questions with serial number 1 – 5.
- Answer all questions.
- Marks are indicated against each question.
- Detailed workings/explanations should form part of your answer.
- Do not spend more than 110 - 120 minutes on Section B.

1. Mr. Jain, a financial analyst in a stock broking firm, wants to test whether market is efficient in semi-strong form or not. Hence, he identified the stocks of Gemini Ltd., Lupin and Everonn Ltd. which have announced the dividends recently. As per the historical evidence, the following relationships between the returns of the stock of these companies and the returns of the market are observed:

$$r_{g,t} = 1.62\% + 1.00r_{m,t}$$

$$r_{l,t} = 1.45\% + 1.03r_{m,t}$$

$$r_{e,t} = 1.82\% + 0.97r_{m,t}$$

Where $r_{g,t}$, $r_{l,t}$ and $r_{e,t}$ are the respective returns on the stocks of the three companies during period 't' and $r_{m,t}$ is the market return during the same period. The data pertaining to the returns of the companies and market prior to the announcement of dividends and after the announcement are as below:

Period (months)	Actual return (%)			Market return (%)
	$r_{g,t}$	$r_{l,t}$	$r_{e,t}$	$r_{m,t}$
4	12.80	11.49	12.68	10.45
3	11.30	11.44	10.85	9.50
2	11.59	11.73	12.75	10.59
1	12.32	12.46	12.24	10.34
0	11.20	12.92	11.10	10.36
1	10.46	10.97	11.79	9.55
2	12.44	12.59	12.34	10.50
3	13.78	13.97	12.37	11.54
4	13.26	13.46	13.92	12.04

Considering the above information, you are **required** to assist Mr. Jain to test the consistency of the semi-strong form of market efficiency.

(10 marks)

2. Consider the following information pertaining to a bond issued by Indian Industries Limited:

Face value and Redemption value	Years to maturity	Coupon
Rs.1,000	4	9% payable annually

The yield to maturity from the same quality bonds of 4 year maturity is 9.5%, 3 years maturity is 9.25%, 2 years maturity is 9% and 1 year maturity is 8.75%. The yields for all the maturities are expected to decline by 25 basis points after one year.

You are **required** to:

- Find total return from the bond over a one year period.
- Show that the total return from the bond is equal to the sum of:
 - Current yield.
 - Amortization of premium or discount.
 - Price change due to slope.
 - Price change due to shift in yield curve.

(5 marks)

(5 marks)

3. Mr. Mehta, an investor in derivatives market, believes that in next three months, market will not move significantly in either direction. He wants to create an option strategy to obtain the benefits from his view and at the same time he wants to keep his initial investment low. Mr. Mehta has collected following information pertaining to call options on a stock, which is currently trading at Rs.82.

Strike price (Rs.)	Call price (Rs.)	Maturity (months)
88	7	3
81	10	3

(10 marks)

74	15	3
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You are **required** to suggest the suitable option strategy to Mr. Mehta and also show the payoff table and payoff diagram for the strategy suggested indicating the maximum profit/loss and breakeven point(s).

(Assume that on expiration day, the stock price may range between Rs.72 and Rs.89 in multiple of Re.1)

Caselet

Read the caselet carefully and answer the following questions:

4. As mentioned in the caselet, owing to interest rate fluctuations, avoiding bond mutual funds and sticking to the traditional fixed-return and fixed period instruments may not be the right approach since investing in these instruments does not altogether immunize the portfolio from interest rate risks. In this context, explain the risks associated with these investments. [<Answer>](#)
- (8 marks)**

5. As discussed in the caselet, duration explains the sensitivity of net asset value of bond fund to the changes in interest rates. Owing to this, when bond fund manager anticipates interest rates to decline, he has to increase the duration of his bond portfolio and vice versa. In light of this, critically analyze how bond fund manager can make use of duration to maximize the return in anticipation of the change in interest rates. [<Answer>](#)
- (12 marks)**

While many factors, such as inflation expectations and supply and demand, will impact interest rates, it's important to understand the Fed's role as well. The Fed's Federal Open Market Committee, currently chaired by Ben Bernake, regulates short-term interest rates with the aim of promoting economic growth (and thus employment) and stable prices (or modest inflation). To achieve those goals, the FOMC has three levers that it can pull: open market operations, the discount rate, and setting bank reserve requirements. Recently, investors have witnessed open market operations, in a series of Fed-Funds rate cuts, as well as cuts to the discount rate, designed to stabilize uncertain bond markets and keep the economy from slipping into recession. Each of these tools aids the Fed in regulating money supply and thus in either stimulating or reining in the economy.

A declining Fed-Funds rate has traditionally been a boon for financials stocks, which often depend on short-term borrowing to finance business operations. Consumer stocks could also get a lift, too, because lower rates mean that customers are less pinched. But we need to keep in mind that interest rates aren't the only factor affecting stock prices. If the Fed's recent moves don't prevent a recession, consumer-focused stocks could get hurt. But the relationship between interest rates and bonds is more straightforward. Rising rates are bad for bonds; bond prices fall when interest rates go up. The opposite is true as well, which is why bonds typically rally when the Fed cuts rates. One way to gauge a fund's sensitivity to interest rates is by taking a look at its duration. If a fund has duration of 10 years, for instance, it means that the average price of a bond in its portfolio will either rise or fall roughly 10% for every 1 percentage point change in interest rates. When bond fund manager anticipates interest rates to decline, he has to increase the duration of his bond portfolio and vice versa. There's more to how interest-rate fluctuations impact returns. While the Fed has made some dramatic moves to try to revitalize the slowing economy, the actions of Fed change the interest rate structures in other economies like India, and this is the time for Indian investors should exercise caution in attempting to take advantage of these developments.

Investor might be tempted to pile into a fund that invests in long-term bonds, which are most sensitive to rate changes. But he needs to keep in mind that rates aren't the only thing that impacts the prices of bonds. A bond's credit worthiness can have a big effect, too. As a result, duration sensitivity is highest in Treasury issues (where there is effectively no credit risk) and can be much lower in the lower-quality region of the bond market. Many bond-fund managers will tweak their portfolios in an effort to get ahead of Fed rate change

actions. But, getting interest-rate bets consistently correct and being able to adequately take advantage of those moves is extremely difficult. As a result, investors should pay as much attention to diversifying their bond-fund portfolios as they would to their stock-fund choices. By remaining diversified among a few bond-fund options, investors can be well positioned regardless of what direction interest rate changes take. If even the pros have a tough time figuring out where interest rates are headed in the short term and what effects they'll have in the future, his time is better spent finding investments that will likely do well over the long haul.

The recent fluctuations in interest rates have brought into sharper focus, for the retail investor in debt schemes of Indian mutual funds, their impact on the Net Asset Values (NAV) of these schemes. NAVs of mutual fund debt schemes have been effected and the market has taught investors the implication of interest-rate risk for their investments. Interest rate expectations and changes have exerted their influence on short-term returns of investors in mutual fund debt schemes. Yet, the increased media attention and the significant increase in the number of investors in mutual fund schemes have added an entirely new dimension to this episode. Given this backdrop of interest rate fluctuations, there is a tendency for the investor to avoid mutual funds and stick to the traditional fixed-return, fixed period instruments such as fixed deposits, bank term deposits, government small savings schemes and bonds of financial institutions so as to insulate their portfolio from interest rate risks. However, that may not be the right approach since investing in fixed-return, fixed-period investments does not altogether immunize the portfolio from interest rate risks.

**END OF
CASELET**

END OF SECTION B

Section C : Applied Theory (20 Marks)

- This section consists of questions with serial number 6 - 7.
- Answer all questions.
- Marks are indicated against each question.
- Do not spend more than 25 - 30 minutes on Section C.

6. Econometric approach is one of the most formal short-term forecasting approaches. This approach tries to describe the present economic condition as a function of certain policies and variables and the economic relationship attached to these variables. Explain the advantages and problems of using econometric models. [<Answer>](#) (10 marks)

7. Credit risk in bond portfolio management is defined as the risk of the non-payment of principal and interest, downgrading and widening of credit swap. Credit derivative is one of the useful tools to diversify or acquire credit risk. Explain various credit derivatives generally used in fixed income portfolio management. [<Answer>](#) (10 marks)

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers

Portfolio Management (CFA640): January 2009

Section A : Basic Concepts

- | Answer | Reason |
|--------|---|
| 1. E | According to Jack Treynor, key motives for trading are value, information and cash flow. The value traders can use time according to their convenience so that by extending the time of trading, they can reduce the cost of trading, Information traders tend to be more sensitive to time. < TOP > |
| 2. E | Tracking error can be caused by < TOP >
I. Transaction costs in construction of the index.
II. Differences in the composition of the indexed portfolio and the index itself.
III. Discrepancies between prices used by the organization constructing the index and transaction prices paid by the index manager.
Therefore, correct answer is option (e). |
| 3. D | The risk penalty is higher for smaller values of risk tolerance and higher values of variance of asset mix. Hence option (II) is false and option (I) and (III) are correct. Hence option (d) is said to be the correct answer. < TOP > |
| 4. A | A long straddle involves buying a call and put options with same exercise price and expiration date. Strip strategy involves buying two puts and one call with same exercise price and expiration date. As strip involves one more put option it can be called as bearish version of straddle. < TOP > |
| 5. E | An international portfolio manager requires the following information. (a) Return available in different countries. (b) The risks attached to each foreign market and (c) The coefficient of correlation across international markets. All (I), (II) and (III) is correct. < TOP > |
| 6. C | The various factors considered by Burmeister, Ibbotson, Roll and Ross macro economic factor model (BIRR model) are investor confidence, interest rates, inflation, real business activity and market index. Exchange rate fluctuation is not considered. < TOP > |
| 7. D | $\text{Slope of CML} = \frac{(E(R_m) - r_f)}{\sigma_m} = \frac{14.48 - r_f}{20} = 0.4$ $r_f = 6.48\%$ Let the price of 91 day t-bill be x
$\text{Price} = \frac{100 - x}{x} \times \frac{365}{91} = 0.0648$ $X = \text{Rs.}98.41.$ < TOP > |
| 8. C | Capital Market line depicts the relationship between return and risk. It shows the return expected by investors on efficient portfolios for various levels of risk. It is upward sloping because the investors are risk averse and would like to be adequately compensated for additional risk undertaken by them. Hence (c) is the correct answer. < TOP > |
| 9. B | Packaged trade is an approach of trading index fund. It is actually a process of bundling of a number of orders for simultaneous execution in the market. The goal of a fund manager is to get his money invested as quickly as possible with least cost. Since statement (II) is false, alternative (b) is answer. < TOP > |

10. D Probability of price rise in Binomial Model is given by [< TOP >](#)
- $$P = \frac{R - d}{u - d}$$
- $$R = 1.06$$
- $$u = 99.20/80 = 1.24$$
- $$d = \frac{60.80}{80} = 0.76$$
- $$P = \frac{1.06 - 0.76}{1.24 - 0.76} = 0.625$$
- The probability of price decrease is $1 - 0.625 = 0.375$.
11. D Change in YTM $= 12.7 - 12.6 = 0.10\%$ [< TOP >](#)
- $$\text{Change in price of the bond} = \left(\frac{-8}{1.126} \right) \times (0.10) = -0.71\%$$
12. B Cost of carry $= I (R_f - D)$ [< TOP >](#)
- $$= 9980 (0.075 \times 0.25 - 0.25 \times 0.045)$$
- $$= \text{Rs.} 74.85.$$
13. B According to the single index model [< TOP >](#)
- $$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{m,t} + \varepsilon_{i,t}$$
- Where,
- $$r_{i,t} = \text{Return on security i in time period t}$$
- $$r_{m,t} = \text{Return on the market index in time period t}$$
- $$\alpha_{i,t} = \text{A constant, the portion of return on stock i that is not related to the market return}$$
- $$\varepsilon_{i,t} = \text{Error term, the portion of the security's return that is not captured by } \alpha_i \text{ and } \beta_i$$
- $$\beta_{i,t} = \text{Beta of security i}$$
- $$17.25 = 1.5 + \beta_{i,t} \times 20 + 0.75$$
- $$\beta_{i,t} = 0.75.$$
14. A [< TOP >](#)
- $$R_i = \left[\frac{(P_i - 0.5C_i)}{(P_o + 0.5C_i)} - 1 \right] \times 100$$
- $$26.24 = \left[\frac{(18,00,000 - 0.5C_i)}{(12,00,000 + 0.5C_i)} - 1 \right] \times 100$$
- $$1.2624 = \frac{(18,00,000 - 0.5C_i)}{(12,00,000 + 0.5C_i)}$$
- $$15,14,880 + 0.6312C_i = 18,00,000 - 0.5C_i$$
- $$1.1312C_i = 2,85,120$$
- Net contributions = 2,52,051.

15. B $\frac{T_d - T_g}{1 - T_g}$ [< TOP >](#)
 Tax factor = $\frac{T_d - T_g}{1 - T_g}$, where T_d = Tax rate on dividend, T_g = Tax rate on capital gain.
 From the above equation, if tax rate on dividend yield is less than tax rate on capital gains, tax factor is negative. When tax factor is positive, investors in higher tax brackets will prefer to hold a higher percentage of low-yield high capital gains stocks to maximize their post-tax return and expected pre-tax return will be an increasing function of the dividend yield. When tax factor is negative, vice versa. Investors in tax brackets, where marginal tax rate is not significantly different from capital gain tax rate may prefer to hold high-yield stocks. Hence, statement (III) is not true and correct answer is option (b).
16. D In calculating the realized rate of return on portfolio MWROR, TWROR and LWROR [< TOP >](#)
 are the three methods. The time weighted Rate of return explains that it seeks to eliminate the distorting effect of cash flows so that more valid comparisons of fund manager's investment skills can be made. Under linked IRR the inflows to and outflows from a fund are spaced across the time when one is dealing with the fund of an individual investor. And for money-weighted rate of return it is simply the IRR over that period. Hence option (ii) and option (iii) are correct. Thus option (d) is said to be the answer.
17. E Defined Benefit Plans, usually involve a pension trust where there is a promise to pay [< TOP >](#)
 a definite level of pension, not directly related to the contributions made to the fund by the employees or by their employer on their behalf. In defined contribution plan, If the pension or provident fund loses money in investments or earns lower than benchmark return, the employee bears the loss or opportunity loss.
 Therefore all statements are not true and correct answer is option e.
18. A According to Kathleen Gurney's 'Nine Money Personalities' model, Hunters are often [< TOP >](#)
 educated and high-earning women with an impulsive streak, a 'live now attitude'. They have a strong work ethic, much like entrepreneurs, but lack the same confidence in themselves. They may attribute their success to luck rather than ability.
 Thus, correct answer is option (a).
19. C Duration of assets = $(8 \times 0.4) + (10 \times 0.6) = 9.2$ Years [< TOP >](#)
 Duration of liabilities = 12 Years
 Duration of liabilities > Duration of assets
 Reinvestment risk arises due to mismatch between duration of assets and duration of liabilities. Therefore pension fund is facing reinvestment risk.
20. D The passive strategy to fill in these holes completes the desired coverage and hence it [< TOP >](#)
 is called completeness fund.
21. A While managing a portfolio, at strategic level of decision making process, the setting [< TOP >](#)
 of benchmark is done. Hence, alternative (a) is answer.
22. B Conversions mean holding a long position stock while creating a synthetic short [< TOP >](#)
 position in order to get the possibility of arbitrage profits.
23. D With average beta of the portfolio [< TOP >](#)
 $0.96 \times 0.133 + 1.06 \times 0.200 + 0.87 \times 0.167 + 1.08 \times 0.500$
 $= 1.025$
 Expected returns $= 7.20 + 1.025 (12.5 - 7.20)$
 $= 12.6325\% \sim 12.63\%$
24. E Maximum Profit for the writer of the option strategy [< TOP >](#)
 $= (\text{Premium received from call option \& put option written}) \times \text{contract size}$
 $= (1125 \times 8.85 + 400 \times 5.25) = \text{Rs.} 12,056.25$
 The above maximum profit occurs, if the market prices of the shares remain at their respective strike prices or come down below strike prices for call options and go above strike prices for put options and neither call nor put is exercised.

25. C Rational investors buy at higher return stock (since it is under priced) with lower [< TOP >](#) standard deviation and sell low return stock (since it is overpriced) with higher standard deviation to make arbitrage profits.
26. E The current price of the bond = $10,000/1.12^{25} = \text{Rs.}588.23$ [< TOP >](#)
 The price of the bond after one year = $10,000/1.12^{24} = \text{Rs.}658.82$
 The imputed interest = $\text{Rs.}658.82 - \text{Rs.}588.23 = \text{Rs.}70.59$.
27. D [< TOP >](#)
- $$\text{Number of contracts} = \text{Hedge ratio} \times \frac{\text{Par value to be hedged}}{\text{Par value of contract}}$$
- $$7 = \text{HR} \times \frac{15000}{1575}$$
- $$\text{HR} = 0.735$$
- $$\text{Hedge ratio} = \frac{\text{volatility of bond to be hedged}}{\text{volatility of hedging instrument}}$$
- $$0.735 = \frac{10.25}{\text{Volatility of hedging instrument}}$$
- Volatility of hedging instrument = Rs.13.95.
28. E The payoff diagram shows that profit is possible from this strategy if market prices is [< TOP >](#) range bound and this profit will fall between two distinct prices. Hence the strategy is short strangle, and the answer is (e).
29. B The revised estimate of the expected rate of return of the stock would be the old [< TOP >](#) estimate plus the sum of the unexpected changes in the factors times the sensitivity coefficients, i.e., revised estimate = $12\% + (1 \times 2\% + 0.5 \times 3\%) = 15.5\%$.
30. D The Black Scholes model can be used for pricing the European option. Therefore (I) [< TOP >](#) is not correct. Black Scholes model cannot be used for complex options and historical data is used to value the option, hence (II) and (III) are correct.

Portfolio Management (CFA640): January 2009

Section B : Problems/Caselet

1. Gemini Ltd. ($r_{g,t} = 1.62\% + 1.00r_{m,t}$)

Period	Actual Return (%)	Market Return (%)	Expected Return (%)	Abnormal Return (%)
4	12.80	10.45	12.07	0.73
3	11.30	9.50	11.12	0.18
2	11.59	10.59	12.21	-0.62
1	12.32	10.34	11.96	0.36
0	11.20	10.36	11.98	-0.78
1	10.46	9.55	11.17	-0.71
2	12.44	10.50	12.12	0.32
3	13.78	11.54	13.16	0.62
4	13.26	12.04	13.66	-0.40

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Lupin ($r_{l,t} = 1.45\% + 1.03r_{m,t}$)

Period	Actual Return (%)	Market Return (%)	Expected Return (%)	Abnormal Return (%)
4	11.49	10.45	12.21	-0.72
3	11.44	9.50	11.24	0.20
2	11.73	10.59	12.36	-0.63
1	12.46	10.34	12.10	0.36
0	12.92	10.36	12.12	0.80
1	10.97	9.55	11.29	-0.32
2	12.59	10.50	12.27	0.32
3	13.97	11.54	13.34	0.63
4	13.46	12.04	13.85	-0.39

Everonn Ltd. ($r_{e,t} = 1.82\% + 0.97r_{m,t}$)

Period	Actual Return (%)	Market Return (%)	Expected Return (%)	Abnormal Return (%)
4	12.68	10.45	11.96	0.72
3	10.85	9.50	11.04	-0.19
2	12.75	10.59	12.09	0.66
1	12.24	10.34	11.85	0.39
0	11.10	10.36	11.87	-0.77
1	11.79	9.55	11.08	0.71
2	12.34	10.50	12.01	0.33
3	12.37	11.54	13.01	-0.64
4	13.92	12.04	13.50	0.42

Calculation of average abnormal returns for each of the months.

Period	Abnormal Return $r_{g,t}$ (%) (1)	Abnormal Return $r_{l,t}$ (%) (2)	Abnormal Return $r_{e,t}$ (%) (3)	Average Abnormal Return (%) (1+2+3)/3
4	0.73	-0.72	0.72	0.243
3	0.18	0.20	-0.19	0.063
2	-0.62	-0.63	0.66	-0.197
1	0.36	0.36	0.39	0.370
0	-0.78	0.80	-0.77	-0.250
1	-0.71	-0.32	0.71	-0.107
2	0.32	0.32	0.33	0.323
3	0.62	0.63	-0.64	0.203
4	-0.40	-0.39	0.42	-0.123

Cumulative Average Abnormal Return (CAAR) = $0.243 + 0.063 - 0.197 + 0.370 - 0.250 - 0.107 + 0.323 + 0.203 - 0.123 = 0.525$

Since the value of CAAR is greater than zero, we conclude that markets are not efficient in the semi-strong form.

2.a. Current Market Price,

$$P_0 = 90 \times \text{PVIFA}(9.50, 4) + 1,000 \times \text{PVIF}(9.5\%, 4)$$

$$= 90 \times \frac{(1.0950)^4 - 1}{0.0950 \times (1.0950)^4} + \frac{1000}{(1.0950)^4}$$

$$= 90 \times 3.204 + 1000 \times 0.696 = \text{Rs.} 984.36$$

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Market price of bond after 1 year at discount of 9% as per new yield curve

$$P_1 = 90 \times \text{PVIFA}(9\%, 3) + 1,000 \times \text{PVIF}(9\%, 3)$$

$$= 90 \times \frac{(1.09)^3 - 1}{0.09 \times (1.09)^3} + \frac{1000}{(1.09)^3}$$

$$= 90 \times 2.531 + 1000 \times 0.772 = \text{Rs.}999.79$$

Total return for holding the bond for a year

$$= (\text{coupon income} + \text{price change}) / \text{initial price}$$

$$= [(90 + (999.79 - 984.36)) / 984.36]$$

$$= 0.1071 \text{ i.e., } 10.71\%$$

b. Market price of bond after 1 year at the discount rate of 9.5% assuming a flat yield curve

$$P'_1 = 90 \times \text{PVIFA}(9.5\%, 3) + 1000 \times \text{PVIF}(9.5\%, 3)$$

$$= 90 \times \frac{(1.0950)^3 - 1}{0.0950 \times (1.0950)^3} + \frac{1,000}{(1.0950)^3}$$

$$= 90 \times 2.509 + 1,000 \times 0.762 = \text{Rs.}987.81$$

Market price of bond after 1 year at the discount rate of 9.25%

$$P''_1 = 90 \times \frac{(1.0925)^3 - 1}{0.0925 \times (1.0925)^3} + \frac{1,000}{(1.0925)^3}$$

$$= 90 \times 2.52 + 1000 \times 0.767 = \text{Rs.}993.8$$

$$\text{Total Return} = C + A + R + I$$

$$\text{i. Current yield, } C = \frac{90}{984.36} = 0.0914 \text{ i.e., } 9.14\%$$

$$\text{ii. Amortization of premium/discount, } A = \frac{\text{Price change on level yield curve}}{\text{Initial or beginning price}}$$

$$= \frac{987.81 - 984.36}{984.36} = 0.0035 \text{ i.e. } 0.35\%$$

$$\text{iii. Price change due to slope, } R = \frac{993.8 - 987.81}{984.36} = 0.0061 \text{ i.e., } 0.61\%$$

$$\text{iv. Return on account of change in Interest Rate, } I = \frac{999.79 - 993.8}{984.36} = 0.0061 \text{ i.e., } 0.61\%$$

Therefore, total return = 9.14 + 0.35 + 0.61 + 0.61 = 10.71% i.e. 10.71% as arrived in (a) above.

3. The appropriate strategy is long butterfly spread.

Mr Mehta could create a long butterfly spread by buying one call option each at strike prices Rs.88 and Rs.74 and selling two call options at the intermediate strike price Rs.81.

Initial cash flow = $-7 - 15 + (2 \times 10) = -\text{Rs.}2$.

Pay-off table

(in Rs.)

Stock price	Pay-off from long call (strike price Rs.88)	Pay-off from long call (strike price Rs.74)	Pay-off from two short calls (strike price Rs.81)	Initial cash flow	Net pay-off
72	0	0	0	-2	-2
73	0	0	0	-2	-2
74	0	0	0	-2	-2
75	0	1	0	-2	-1
76	0	2	0	-2	0
77	0	3	0	-2	1

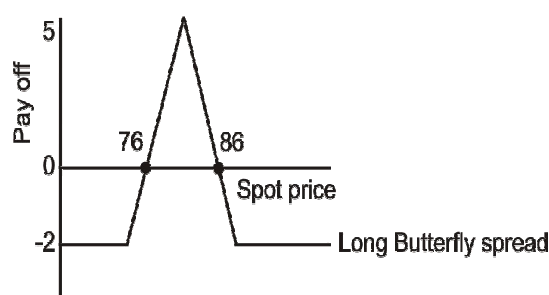
78	0	4	0	-2	2
79	0	5	0	-2	3
80	0	6	0	-2	4
81	0	7	0	-2	5
82	0	8	-2	-2	4
83	0	9	-4	-2	3
84	0	10	-6	-2	2
85	0	11	-8	-2	1
86	0	12	-10	-2	0
87	0	13	-12	-2	-1
88	0	14	-14	-2	-2
89	1	15	-16	-2	-2

Therefore maximum possible profit = Rs.5

Maximum possible loss = Rs.2

Breakeven points are Rs.76 and Rs.86

Payoff diagram



4. For an investor in fixed-income instruments, interest rate changes produce price and reinvestment risks. A change $\leq$ in the interest rate alters the price at which a fixed-income investment can be sold. For example, the increases in TOP $\geq$ the interest rates would decrease the price at which investors can sell fixed-income investments. However, this does not apply to fixed-period investments held till maturity. But they are exposed to the other, reinvestment, risk. Fixed-period investments generate cash inflows such as interest and maturity receipts. These cash flows come at specified periods of time. The reinvestment of these cash flows can be made only at the prevailing interest rate. This rate is more often than not likely to be different from that at which investments were made. This is reinvestment risk.

For fixed-period investments, when the interest rate rises, the reinvestment risk works out to their benefit - reinvestment can be made for a rate higher than at the initial investment. Similarly, when interest rates decline, the funds can be considered to have been locked at a higher rate. Once again, this is only half the story. The reinvestment of cash flows can be made only at a lower rate. A lot of significance is attached to the reinvestment rate. It determines the realised yield on an investment. In short, changes in interest rates affect the realised yield on the fixed-period investment too and do not always work in favor of investors in fixed-period investments. In any event, completely insulating the portfolio from interest rate risk is unachievable.

5. The duration indicates the sensitivity of bond prices to changes in interest rates and there is inverse relationship $\leq$ between bond prices and interest rates. For a bond fund manager, interest rate anticipation is more difficult task. TOP $\geq$ When he anticipates interest rates to decline, he has to increase the duration of his bond portfolio. For that he has to increase his investment in long duration bonds (i.e., long maturity and low coupon bonds). This enhances the opportunity to increase total return in the short run through price appreciation. Alternatively, if interest rates are expected to rise, moving into shorter-duration bonds i.e., short maturity and high coupon bonds aids in preserving capital, which, in turn, can stabilize or increase the total return in a market with falling prices. However, these may seem straightforward, once the direction of interest rates is decided. But, this strategy may not always provide expected result, when other factors are ignored. For example, bond fund manager anticipates a fall in interest rates. To take advantage of this expected decline, he considers increasing his holdings in long-term, low-coupon securities that are currently selling at a discount. The long duration of these bonds will make them especially sensitive to declining interest rates. However, such a move also produces a low-level of income through coupons and reinvestment at lower rates. Therefore, he can consider investing in longer-term current-coupon bonds. Although the duration of these bonds will not produce as much price appreciation as the low coupon discount securities, the additional income, when combined with some price appreciation, may provide a better overall return, especially, if interest rates decline only slightly. Thus, the decision about the type of long-duration

bonds to invest in, must consider the need for current income as well as how low and how soon the interest rates will fall. Further, regardless of his choice, he should choose marketable, highly liquid securities for ease in making the portfolio shift. This will enable him to restructure his portfolio with the greatest ease. In addition, he can emphasize quality (e.g., treasury securities), since the higher the quality, the more sensitive the prices are to changing interest rates.

Expectations of an increase in interest rates provide for altogether different portfolio considerations. When interest rates are expected to rise, a primary consideration for many investors is the preservation of capital, that is, the need to avoid large price declines due to increased interest rates. The natural instinct would be to move into very short-term, highly liquid investments such as money market securities whose short duration makes their values relatively insensitive to changes in market yields. As changes in interest rates usually affect the short-term yields more than long-term yields, these securities' yields will quickly reflect any rate increases. Therefore, he needs to consider various factors before changing duration of the portfolio based on interest rate anticipations.

Section C: Applied Theory

6. Advantages of using econometric Models

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Following are the main advantages of using models:

- Testing of hypothesis and idea of an economic indicator. Examples: Test to know how low interest rates stimulate growth and whether wages can be used as a predictor of inflation.

Estimating sensitivities. Example: Would one percentage point rise in the US Consumer Price Index typically translate into 1 a-year bond yield?

Developing internally consistent forecasts. Example: When researchers are using a judgmental approach, they may fail to see that something they are implying about income growth does not jibe with their assumption on employment growth.

Running simulation of complex scenario. Example: A government economist may need to find out what happens if interest rates and government spending are both cut.

Problems in the Use of Models

The main problem in using the models is the lack of consistency of the data. Investment professionals should be aware of this before any decision is taken based on these models. Other problems that arise in these models are:

- **Implausible Result:** A number of variables used to isolate one may cause an implausible result. If any of the variables among them is working then the prediction might be quite unreliable.

Statistical VS. Real World: The other problem is the difference in the statistical result and the result in the real world.

Error in the Underlying Data: Past data used may be good predictors of some variable but in certain cases where variables are subject to huge revision they create problems when using models.

Assumption: Assumption is the most vital problem in using models. It is not possible to predict every variable, so every model has some assumptions. So it is suggested to be careful while using assumptions.

Structural Changes: Most of the models assume that past relationships have some validity in predicting future relationships but this prediction may not be significant where fundamental structure changes due to rapidly changing economies.

Simultaneity: Simultaneity is the term used to measure the influence of one variable on another when that second variable also influences the first one. These occurrences can create confusion in using statistical models.

Time Series Data: The time series data i.e., the data that frequently changes due to some economic factors like population growth, GDP growth sometimes have a number of problems. These data may violate some assumptions due to their trend properties.

7. Credit risk in bond portfolio management is defined as the risk of the non-payment of [< TOP >](#)

principal and interest, downgrading and widening of credit swap. Downgrading risk is the risk of downgrading the instrument by the credit rating agencies. Return of the bond depends on the risk associated with it, a high rated bond gives lower return than a low rated bond. Credit spread risk is defined as an increase in the interest rate spread over a riskless bond like treasury bills due to purchase of risky bond. Credit derivative is one of the useful tools to diversify or acquire credit risk. Credit derivative is the negotiable financial instrument that is designed to transfer the credit risk of the assets or issuers between two or more parties. It may be in the form of an option, forward or swap where cash flows are linked with the credit characteristics of the bonds. Return from the credit derivative instrument may be the significant part of the portfolio return.

CREDIT OPTION

Credit option is an instrument to protect against credit risk and is different from the standard debt option as the latter is designed to protect against interest rate risk. Credit option is of two types, one which is triggered by a decline in the value of assets and another which is triggered by a change in the asset's spread over a comparable risk-free rate.

There are two types of option writing on an underlying asset:

- Binary credit option with a predetermined pay-out
- Binary credit option based on credit rating.

In a binary credit option with a predetermined pay-out, the option seller has an obligation to pay-out a fixed sum in case of default, but in case of no default at the time of maturity, the option buyer will lose the premium. American binary option can be exercised anytime during its life whereas European binary credit option can be exercised at the time of maturity only.

Binary credit option based on credit rating is another type of option, which is exercised at the time when the credit rating falls below investment grade i.e., option buyer will get money if the credit agency downgrades the instrument below investment grade; otherwise, he will lose the premium. Thus, binary credit option deals with only two outcomes.

CREDIT FORWARD

Credit forward is a useful instrument for the buyer of the credit exposure and the portfolio manager who wishes to hedge the appreciated value of its portfolio. Like the credit option, credit forward may be contracted on bond value or credit spread. Portfolio managers can hedge their earnings by purchasing the credit forward. Increase in the high-yield credit spread results in increase in the value of credit forward while decreasing the portfolio yield.

CREDIT SWAPS

Credit swaps are also of two types like credit options — credit default swap and total return swap. The difference between the two is that the rationale of a credit default swap is to hedge the credit exposure by selling it to a credit protection seller like the credit option while the total return swap is used to increase credit exposure and assume more risk for more return. Credit insurance and swapping risky credit are the two types of credit default swap. In credit insurance, the buyer of the credit protection pays a fee to the seller of the credit protection in return for the right to receive a fixed amount in case of the default of a referenced credit. The buyer of the credit protection continues to receive the total return on the referenced assets until the total return is negative due to default, widening credit spread or downgrading. An alternative to the credit insurance type is the investor agreeing to swap the total return on credit risky assets for fixed periodical payment from the credit protection seller; the pay-off is such that if the credit risk declines in value the investor will repay for the decline plus receive a periodical payment from the seller. This is referred to as swapping risky credit payments.

A total return credit swap is in fact used -to increase the credit exposure. It involves transferring of all of the economic exposure of the asset under consideration to the credit swap purchaser. It includes all cash flows that arise from the referenced assets and their capital appreciation or depreciation. The credit swap buyer pays a floating rate plus any depreciation of the referenced asset to the credit swap seller in return for the exposure assumed.

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